

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. § 601, 7th ed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Mika RINNE, Juha KALLIOKULJU

WARNING: 37 C.F.R. § 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(f) is filed supplying or changing the name or names of the inventor or inventors."

For (title): METHOD FOR INFORMING LAYERS OF A PROTOCOL STACK ABOUT THE PROTOCOL IN USE

CERTIFICATION UNDER 37 C.F.R. § 1.10*

(Express Mail label number is mandatory.)

(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date February 7, 2000, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL336861932US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Elaine Mian

(Type or print name of person mailing paper)

Elaine Mian

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

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1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)
☐ Design
☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional.
☐ Continuation.
☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

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WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

- A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

17 Pages of specification

5 Pages of claims

3 Sheets of drawing

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).
- ☐ formal
- ☐ Informal

B. Other Papers Enclosed

6 Pages of declaration and power of attorney

1 Pages of abstract

Other

4. Additional papers enclosed

- ☐ Amendment to claims
- ☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
- ☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)
- ☐ Preliminary Amendment
- ☒ Information Disclosure Statement (37 C.F.R. § 1.98)
- ☒ Form PTO-1449 (PTO/SB/08A and 08B)
- ☒ Citations

- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

5. Declaration or oath (Including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

☒ Enclosed

Executed by

(check all applicable boxes)

☒ Inventor(s).

☐ legal representative of inventor(s).
37 C.F.R. §§ 1.42 or 1.43.

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

8. Assignment

☒ An assignment of the invention to Nokia Mobile Phones Ltd.

☒ is attached. A separate ☒ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

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9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
Finland	990264	10 February 1999
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☒ Is (are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or international application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. § 1.16)

A. ☒ Regular application

CLAIMS AS FILED			
Number filed	Number Extra	Rate	Basic Fee 37 C.F.R. § 1.16(a) \$ 690.00
Total			
Claims (37 C.F.R. § 1.16(c))	24 - 20 = 4	× \$ 18.00	72.00
Independent			
Claims (37 C.F.R. § 1.16(b))	4 - 3 = 1	× \$ 78.00	78.00
Multiple dependent claim(s), If any (37 C.F.R. § 1.16(d))		+ \$260.00	

☐ Amendment cancelling extra claims is enclosed.

☐ Amendment deleting multiple-dependencies is enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation \$ 840.00

B. ☐ Design application
(\$310.00—37 C.F.R. § 1.16(f))

Filing Fee Calculation \$

C. ☐ Plant application
(\$480.00—37 C.F.R. § 1.16(g))

Filing fee calculation \$

11. Small Entity Statement(s)

- ☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application _____ / _____, filed on _____, from which benefit is being claimed for this application under:

35 U.S.C. § ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)
\$ _____

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.

(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Filing fee \$ 840.00

☒ Recording assignment
(\$40.00; 37 C.F.R. § 1.21(h))
(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".) \$ 40.00

☐ Petition fee for filing by other than all the
inventors or person on behalf of the inventor
where inventor refused to sign or cannot be
reached
(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(l)) \$ _____

☐ For processing an application with a
specification in
a non-English language
(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k)) \$ _____

☐ Processing and retention fee
(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(f)) \$ _____

☐ Fee for international-type search report
(\$40.00; 37 C.F.R. § 1.21(e)) \$ _____

NOTE: 37 C.F.R. § 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(f) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed \$ 880.00

14. Method of Payment of Fees

☒ Check in the amount of \$ 880.00

☐ Charge Account No. _____ In the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350:

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

NOTE: "... A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

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16. Instructions as to Overpayment

NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

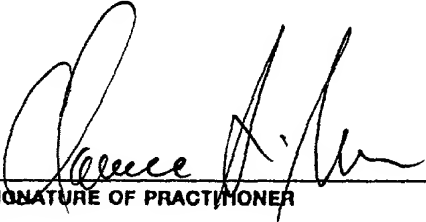
- ☒ Credit Account No. 16-1350
☐ Refund

SEND ALL CORRESPONDENCE TO:

Reg. No. 24,622

Tel. No. (203) 259-1800

Customer No.



SIGNATURE OF PRACTITIONER
Clarence A. Green

(type or print name of attorney)
PERMAN & GREEN, LLP

P.O. Address
425 Post Road, Fairfield, Connecticut 06430

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☒ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☒ This transmittal ends with this page.

TITLE: Method for informing layers of a protocol stack about the protocol in use

TECHNOLOGICAL FIELD

- 5 The invention relates in general to communications protocol stacks. In particular the invention relates to information about the protocols used, which information is communicated between protocol layers.

BACKGROUND OF THE INVENTION

- 10 Data communication connections and the protocols used in them are usually depicted using the Open Systems Interconnection (OSI) reference model which comprises seven protocol layers. The idea of having protocol layers is that the functions of the layers and the interfaces between them are specified in detail, and a protocol in use in a given layer of the protocol stack may be changed into another one when
15 desired. To ensure the interchangeability, the protocol layers only operate on the basis of information contained in the fields of their own particular protocol frames.

- Future communications networks, especially wireless networks, will employ terminals which will have different characteristics and some of which will be more versatile than current terminals. As there will be terminals of different qualities, the
20 application software must to a certain extent be able to adapt to the characteristics of the terminals. Some applications may only be used on certain terminals and with certain protocols, but some of the programs will know how to adapt to the characteristics of the terminal and the data connection in use. If a terminal supports multiple protocol stacks, the protocols used can be negotiated when establishing the data
25 connection. So, an application program does not necessarily have knowledge of the protocol stack on which it is running.

Resources management for data networks will be more complicated because of a wider selection of terminals, increased number of applications, simultaneous use of different protocol stacks and increased use of the wireless network for packet switched data connections, among other things. Problems will be caused especially

5 by the fact that for a reason or another data networks comprise heterogeneous parts. A packet switched data network, for example, may comprise a fixed and wireless part, or a private subnetwork in addition to the public fixed packet data network. Specifications of connections must be communicated across the interfaces, between the different parts of the network: for instance, if one part has less resources than

10 another, it may be necessary to limit the amount of information transferred between them, or if different parts of the network use different meters for the quality of the connection, these quality parameters will have to be replaced by others. If a connection passes through a different part of the network and returns to a network of the original kind, the connection after that second interface should be as much as

15 possible like the original connection. So, resources management at the interfaces and connection mappings across the interfaces should be coordinated.

Fig. 1 shows a packet switched data connection according to the prior art over a radio link. The protocol stacks used in the equipment are shown at the bottom, and the top of the protocol stack may be dynamically negotiated. The lowest two proto-

20 col layers 103 and 104 are always the same both in the transmitter (TX) 101 and in the receiver (RX) 102. These protocol layers are associated with the physical link and its control, in this example with radio wave frequencies, transmission power and possible error correction and retransmission methods. In the transmitter of Fig. 1, the top of the protocol stack may be selected from among three alternatives (105,

25 106, 107), so the transmitter may connect with receivers that support any of these alternatives. In the receiver of Fig. 1, the top of the protocol stack may be selected from among two alternatives (105, 106). The protocols used are negotiated during the connection setup stage so that both apparatus in Fig. 1 will use the same top of the protocol stack, either 105 or 106.

Fig. 2 shows a prior-art packet switched data connection at the interface between a fixed network and a wireless mobile radio access network. The radio access network comprises base stations and radio network controllers. A wireless terminal 201 is connected via a base station 202 to a radio network controller 203. The radio network controller is connected to a network node 204 at the border of the radio access network and the fixed network. By way of example, a second terminal 205 is shown connected directly to the network node. More likely it will be connected to the network node via routers and other network elements.

Fig. 2 shows, at the bottom, the protocol stacks 206-210 of the apparatus. Each protocol layer's protocol is denoted by the letter L plus the number of the protocol layer. In the lowest two protocol layers, which are different for the fixed network and wireless network, the protocols are marked by symbols in which the letter C refers to a fixed network and the letter R stands for radio access network.

The radio access network employs two different first-layer protocols, which are in Fig. 2 denoted by symbols L1/R1 and L1/R2. Protocol L1/R1 is associated with the radio interface between a wireless terminal and base station, so it is used in the protocol stack 206 of the wireless terminal and in the protocol stack 207 of the base station at the radio interface side. Protocol L1/R2 is associated with radio access network connections over a fixed line, so it is used in the base station protocol stack at the radio network controller side, in the radio network controller's protocol stack, and in the protocol stack 209 of the network node 204 at the radio access network side. All radio access network elements as well as the wireless terminal use the same protocol L2/R in the second protocol layer or, if there are sublayers in the second protocol layer, at least its highest sublayer uses the same protocol. In the radio access network elements, protocol stacks 207 and 208 often cover only the lowest two layers.

At the fixed network side, between apparatus 204 and 205, the packet switched data connection is carried on top of a so-called core network bearer service. The term

bearer service refers in this context mainly to the second layer of the protocol stack. The characteristics, say, data transfer capacity or quality, of this core network bearer service are influenced by the physical connections used and the methods associated therewith. The quality of the packet switched data connection proper is usually specified at a higher level, e.g. as quality of service in the IPv6 protocol in the third protocol layer, and the bearer service is chosen such that it can meet the connection quality requirements.

In the network node 203 or alternatively in node 204 the packet switched data connection carried upon a core network bearer service has to be taken on top of a radio access bearer service. In a wireless mobile radio access network there are a certain number of different radio access bearer services, and the qualities that describe them include e.g. the transfer rate, bit error rate (BER) and whether or not the reception of a transferred packet is verified as well as the size of the transfer window used for the verification. The network node must map the core network bearer service to a radio access bearer service that has enough capacity to guarantee a desired connection quality but without wasting radio resources, however. The network node's protocol stack 209 uses in the lowest two layers of the protocol stack fixed network protocols at the fixed network side, and radio access network protocols at the radio access network side.

The third-layer protocol is determined on the basis of the protocol used in the packet switched data network. When a packet switched data connection is established, terminals 201 and 205 may negotiate the protocols used for the end-to-end connection. These protocols usually are protocols on top of the third protocol layer, and they are identical (or at least compatible) in the protocol stack 206 of the wireless terminal and protocol stack 210 of the second terminal. The upper protocol layers do not know that the end-to-end connection between the terminals has crossed a radio interface at some point; as far as they are concerned, the connection could as well be an end-to-end fixed connection.

Prior-art end-to-end connections capable of utilizing dynamically negotiated protocol stacks involve certain problems. For example, in situations where an application knows how to present data as either text, pictures or video, it could exclude the video if it knew that the capacity of the data connection is insufficient to transfer a video image. Moreover, the lower protocol layers do not have knowledge of the capabilities of the upper protocol layers as regards reception of data packets that are in disarray and some of which are missing. If a lower protocol layer does not make sure that the data packets are in order and a higher protocol expects them to be, problems are likely to occur.

10 A prior-art multimedia application may use either one or more data connections for the transfer of data. For example, data in text format may be transferred via one connection, a video image via a second and sound via a third one, and, in addition, the application may all the time have a connection open through which to transfer commands associated with the synchronization of the objects presented. Another
15 alternative is that these data travel through a single data connection, i.e. the application multiplexes the data streams into a single data stream and an application at the other end of the connection demultiplexes them so that they become separate again. If an application uses multiple separate data connections, problems arise if the lower protocol layers do not understand that these connections belong to one and the same
20 application. In a situation where only part of the data can be delivered because of scarce resources, this may result in that the most important packet switched data connection, in which the control commands are transferred, is slowed down or even disconnected.

For prior-art packet switched data network interfaces it is often necessary to either
25 prioritize the data to be transferred, because of scarcity of data transfer resources, or map the connection quality defined in a certain manner to a connection defined by means of other parameters. In these situations, decision-making in the lower protocol layers would benefit if those layers had knowledge of the information trans-

ferred over the connection. For example, knowledge of the typical data transfer rate for the connection would help decide how much resources should be reserved for the connection. In the case of prioritization, more detailed knowledge about the information transferred (whether it is, say, control commands associated with the application software or presentable data) would help in deciding what is the most important information.

SUMMARY OF THE INVENTION

An object of the invention is to provide a method with which it is possible to characterize data for lower protocol layers and the characteristics of the data connection for upper protocol layers. It is advantageous that the method is a hierarchical one, i.e. it is first given a rough description which can then be particularized. It is also advantageous that the description is short.

The objects of the invention are achieved by a method with which it is possible to indicate the protocols or parts of protocols used in given protocol layers to other layers of a protocol stack.

The method according to the invention for transferring information over a data connection in accordance with a protocol stack comprising first and second protocol layers

is characterized in that

- a protocol identifier is created,
- a value for said protocol identifier is determined by means of the first protocol layers in said protocol stack, and
- said protocol identifier is delivered to the second protocol layers in said protocol stack.

The upper-layer protocols or their coding methods, for example, characterize the

amount of data transferred over a connection as well as burstiness of data, for example. Thus they describe the requirements on the data transfer and, thereby, on the lower protocol layers. The protocols also tell, at least partly, what kind of data flow through the packet switched data connection. A method according to the invention, which identifies the protocols of an upper layer or layers, thus tells the lower protocol layers what kind of data they are transferring. Thus it becomes possible to handle the data packets according to their contents. For example, if the upper-layer protocols are such that they operate better when the data packets are delivered reliably and in the correct order, the lower-layer protocols may make sure that this happens.

Correspondingly, certain lower-layer protocols are associated with data connections that have a limited transfer capacity. Thus, using the method according to the invention the upper-layer protocols may obtain information about the data connection. For example, the transfer rate for a high-speed data connection in a GSM (Global System for Mobile Communications) network is a multiple of 9.6 or 14.4 kbps and normally not more than 28.8 kbps. In a third-generation UMTS (Universal Mobile Telecommunications System) network the maximum data transfer capacity is 2 Mbps. If a terminal that can operate in both UMTS and GSM uses the method according to the invention to indicate to an application at the other end of the connection the protocol used in the link layer, the application may use video to present the data, depending on the data transfer rate.

If the method according to the invention is used to communicate information from the upper protocols to the lower protocol layers, the information about the protocol may be added to the protocol frame. Advantageously a field is reserved in the frame for this purpose. Information in the protocol frame reaches all lower protocol layers in the same terminal, network element, network interface and/or terminal at the other end of the connection. If information is to be sent from the lower protocols to the higher ones, it has to be done indirectly. In a terminal, for example, the infor-

5 information about the lower protocols can be locally signaled to a higher protocol which places that information in its protocol frame or inserts it in the data to be transferred. So the information travels over the connection and reaches the upper protocol layers in the network element, network interface and/or terminal at the other end of the connection.

10 In the method according to the invention the information about protocols, protocol versions or protocol elements may be transferred in protocol frames of a certain protocol layer, in a field reserved for that purpose. The advantage of using a special field is that the lower protocols need not go through and analyze the whole contents of the packets, but an identifier found at a certain location of a packet identifies the protocols. Another alternative is to communicate this information when setting up the connection. In that case it may be transferred either in a data packet (say, protocol field) associated with the handshake procedure or in a control connection separate from the packet switched data connection used for the data transfer if such a
15 connection is provided.

Since the protocols used in data communications networks are widely known and ratified by standardizing bodies or corresponding organizations, information about them may be communicated using short identifiers. In addition, the identifier according to the invention for communicating protocol information is advantageously
20 a hierarchical data structure, i.e. a protocol or protocols is/are first identified roughly, whereafter a more detailed definition is given. Such a hierarchical data structure is flexible and fast to process as it quickly indicates whether the more detailed part contains relevant information.

Information communicated by the method according to the invention may be utilized locally in the same terminal, in a network element at the network interface or in
25 a terminal at the other end of the connection. The invention takes no position on how to decide in which layers the protocols are the most important as regards data transfer or data presentation formats, for instance, or where and how this informa-

tion is utilized in the other protocol layers.

BRIEF DESCRIPTION OF DRAWINGS

The invention is below described in greater detail referring to the preferred em-
 5 bodiments of the invention and to the appended drawing, in which

- Fig. 1 shows a prior-art packet switched data connection over a radio link with the protocol stacks,
- Fig. 2 shows a prior-art packet switched data connection over the air interface of a wireless mobile network with the protocol stacks,
- 10 Fig. 3 shows a data communication method according to two preferred embodiments of the invention,
- Fig. 4 shows in greater detail a protocol layer associated with a third preferred embodiment of the invention,
- Fig. 5 shows a data structure used for communicating protocol information ac-
 15 cording to a fourth preferred embodiment of the invention, and
- Fig. 6 shows a schematic of an apparatus that employs the method according to a preferred embodiment of the invention.

Reference was already made to Figs. 1 and 2 in the description of the prior art.

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DETAILED DESCRIPTION OF THE INVENTION

Fig. 3 schematically illustrates two methods according to a preferred embodiment of the invention for communicating information about the protocols in use. The figure shows protocol frames associated with a certain packet switched data connection:
 25 the packet at the far right has been sent first. In each protocol frame, oblique lines indicate that portion of the protocol frame which communicates information about

the protocols in use.

The upper part of Fig. 3 shows a method in which the protocol frames 301-306 used for the data transfer proper carry protocol information as well. By way of example, each protocol frame in the figure contains a protocol identifier 307 (say, a protocol field). Depending on the situation, the identifier may be in every protocol frame or only in part of the frames, e.g. in every hundredth frame.

The bottom part of Fig. 3 shows a method in which the information about the protocols used is communicated at the beginning of the connection. The packets 308-313 associated with the data transfer are in chronological order from right to left. In this case the information about the protocols used is in identifier 314 which is in the first protocol frame 308 of the packet switched data connection, but it is more common that the information is transferred in one or more handshaking messages at the beginning of the connection. Another alternative is that the information is communicated via a separate control connection at the beginning of the connection. For example, in mobile networks a terminal usually has a control connection over the air interface and radio access network to a network node on the border of the radio access network, i.e. the control connection exists between the terminal 201 and network element 204 in Fig. 2. This connection may be one of the so-called call control, session management, mobility management or radio resource management (L3) connections and it relates e.g. to the mobility management of the terminal, to the session management and/or to the management of the frequencies and transmission power used in the radio transmission. It may also be established between the terminal and a switch (not shown in Fig. 2) or another apparatus performing control functions. The information about the protocols used in the packet switched data connection may also be transferred via this control connection when opening the packet switched data connection.

Fig. 4 shows a situation which utilizes a preferred embodiment of the invention. Fig. 4 depicts in more detail the structure of the second protocol layer of a radio access

network in the packet switched data connection of Fig. 2 in an UMTS network. In an UMTS network, the packet switched data connections associated with a certain terminal or application may be linked together by means of an identifier called a packet switched data protocol context.

- 5 At the radio access network side the second protocol layer comprises two sublayers: a link access control (LAC) protocol and media access control (MAC) protocol. Fig. 4 illustrates the operation of the LAC protocol: the third protocol layer is above interface 401 and the MAC layer is below interface 423. The layer 3 compatibility entity (L3CE; essentially equal to PDCP or Packet Data Convergence Protocol) 407
- 10 adjacent to the third protocol layer comprises an administrative unit 408 and the compatibility unit 409 proper. The L3CE is responsible for recognizing the data transfer needs of the packet switched data protocol contexts and for presenting said needs to radio bearer services. Network service access points 403-406 are specified for the upper interface of the L3CE such that each access point has a network
- 15 service access point identifier (NSAPI) of its own. Fig. 4 shows four network service access points by way of example. The L3CE administrative unit 408 has a network service access point 402 of its own.

- Each packet switched data protocol context has at its disposal at least one network service access point via which data are transferred to the compatibility unit. At the
- 20 lower interface 410 of the L3CE there are service access points 412-415 via which data are transferred to radio access bearer services. Each service access point with its characteristics corresponds to a certain type of radio access bearer service and there are as many of them as there are possible different radio access bearer services (Fig. 4 shows four service access points corresponding to four different radio access
- 25 bearer services). Service access point 411 is associated with data communications between the administrative units of the various layers.

Operation of the compatibility unit 409 is controlled through the administrative unit 408 and it has knowledge of the packet switched data protocol contexts' data trans-

fer quality and quantity requirements agreed during the connection setup stage. However its main function is to flexibly map the network service access points to the service access points according to the data transfer needs of each particular network service access point and to limit the data transfer if an attempt is made to use a transfer rate that exceeds the resources reserved for the packet switched data protocol context in question. It distributes the data packets coming through the network service access points to several service access points if they have different connection quality requirements. It is possible to direct data packets from multiple network service access points to one and the same service access point, i.e. a single radio access bearer service may carry information arriving through several network service access points. The compatibility unit may also perform data or protocol field packing.

Logical link entities 419-422 in the logical link control (LLC) layer 416 control the data transfer over individual radio access bearer services. There is one logical link entity per each service access point. These entities use their own protocol structures into the data fields of which they place the data coming from the compatibility unit 409 via the service access point. A logical link management (LLM) entity 417 which controls the logical link entities is responsible, among other things, for the establishment and termination of the logical link connections, setting of initial parameters of a logical link, handling of certain error conditions and for the communication of logical link control parameters between terminals. It communicates with the LLM entities of other network elements in the radio access network through a logical control link unit 418. From the LLC layer the LLC protocol frames are transferred across the LAC-MAC interface 423 at point 424.

In a preferred embodiment of the invention a network node 204 at the interface of the fixed network and radio access network analyzes what protocols are used in the packet switched data connections. Each logical link entity of this network node adds to its protocol frame (all or just part of them or only during the handshake) a proto-

col identifier which indicates the higher protocols used. Information about these protocols arrives at the logical link entities via the LLM entity 417. A protocol identifier may be utilized both for selecting a radio access bearer service for a packet switched data connection and for managing radio access bearer services. The protocol identifier may be especially helpful when solving in the MAC layer problems such as repeated retransmissions caused by traffic congestion or transmission deadlocks. For example, selection of retransmission mode, size of possible acknowledge window and adjustment of that size, management of LLC packets, and estimation of the quantity of data transferred are functions where the identification of higher protocols is useful. If, for example, it is known that an application requires real-time data transfer, the radio access bearer service will not carry out retransmissions and tries to send the packets in correct order.

Fig. 5 shows a hierarchical data structure 500 according to a preferred embodiment of the invention which identifies protocols in a multiprotocol environment. It is used e.g. in a radio access network to communicate information between the LLC and MAC layers shown in Fig. 4. The protocol identifier may be placed either in a special field in the protocol frame or within the data proper. The protocol identifier shown in Fig. 5 is two bytes long: the bytes are represented as horizontal rows and bits as vertical columns, the least significant bit being farthest to the right.

The most significant bit 501 in the first byte is a so-called poll/final (PF) bit the meaning of which depends on the type of protocol frame in the protocol field of which the protocol identifier is placed. The next four bits 502 are used for rough protocol identification, so the field could be called a protocol content identifier, for example. Each of these four bits is a so-called flag, indicating whether a given protocol is in use. The bottom part of Fig. 5 shows the structure of the protocol content identifier 502 in more detail. The protocols chosen are data communication protocols typically used in packet switched networks. For example, the first IP (Internet Protocol) identifier in the protocol content identifier is associated with the network-

- layer protocol: 0 indicates that the network protocol used is not IP, and 1 indicates that the protocol is IP. The second PR (Packet Radio) identifier is associated with the wireless packet switched network used: 0 indicates that a GPRS (General Packet Radio Service) network is not used, and 1 indicates that a GPRS network is used.
- 5 The third TU (Transmission Control Protocol / User Datagram Protocol) identifier distinguishes between the TCP and UDP protocols: 0 corresponds to the use of UDP and 1 corresponds to the use of TCP. The fourth AP (Application Protocol) identifier indicates whether or not the data structure describes the application protocol in more detail (0 means no, 1 means yes).
- 10 The last three bits in the first byte of the protocol identifier 500 constitute a protocol field 503 which defines the application protocol in use. The field could be called a protocol content identity group, for example. If the IP identifier is 1 in the protocol content identifier, value 000 in the protocol content identity group corresponds to the IPv4 protocol and value 001 to the IPv6 protocol, for example. If the AP identifier is 1 in the protocol content identifier, value 000 in the protocol content identity group corresponds to Hypertext Transfer Protocol (HTTP), 001 corresponds to the lighter Wireless Application Protocol (WAP) used for wireless connections, 010 corresponds to the MHEG application protocol designed for the presentation of multimedia and hypermedia, and 011 corresponds to JAVA protocol. If it is desired
- 15 to communicate information about both the IP version and application protocols, this can be accomplished e.g. such that in every other frame, in which the protocol identifier is placed, the IP identifier value is 1 and AP identifier value 0 (so the protocol content identity group indicates the IP version) and in every other frame the IP identifier value is 0 and the AP value is 1 (the protocol content identity group indicates the application protocol). Other ways of communicating information about the both items include e.g. specifying the protocol identifier such that it has longer fields or that there are more of them. Then it is possible to communicate more
- 20 information in one protocol identifier.
- 25

The second byte 504 in the data structure 500 is a content descriptor in which each bit serves as a flag. Thus, eight protocols may be identified, and the least significant bit in the byte, for example, corresponds to the highest-layer protocol. A content descriptor is specified for the protocol groups that can be identified in the protocol content identity group. For example, the following flags have been specified for the WAP group, starting from the least significant bit: Wireless Application Environment (WAE), Wireless Session Protocol (WSP), Wireless Transaction Protocol (WTP), Wireless Transport Layer Security (WTLS), and Wireless Datagram Protocol (WDP). Similarly, specified for the MHEG group are the MHEG control, MHEG startup container, MHEG object, and MHEG link. Packets marked with these descriptors contain certain type of information associated with the MHEG application, e.g. MHEG control packets contain control and synchronization information for the application presenting the multimedia objects.

A preferred embodiment of the invention is to use a protocol identifier in a situation in which application software, say a multimedia application, uses several separate data connections. If the multimedia objects are presented using the MHEG format, for example, the above-described or a corresponding protocol identifier may be used to identify said connections as belonging to one and the same application. These data connections may thus be controlled in a consistent manner at the radio access network interface, for example. Thus e.g. a situation is avoided in which the multimedia objects are successfully delivered to the other end of the connection but the control commands necessary for their presentation are not delivered because of lacking resources.

Fig. 6 shows an apparatus which applies the method according to a preferred embodiment of the invention. The apparatus 600 is a communications device, shown here as a wireless terminal. Operation of the apparatus is controlled by a control unit 601 which is responsible, among other things, for the protocol stack 602 associated with data communications. The method according to a preferred

embodiment of the invention is applied to the second protocol layer in Fig. 6. By way of example, its structure is the same as in Fig. 4, and also shown in Fig. 6 are the compatibility layer 407 adjacent to the third layer and the logical link control layer 416. Elements and interfaces of these layers are not named in Fig. 6 but they are the same as in Fig. 4. The apparatus shown in Fig. 6 may include in LLC protocol frames information about the protocols of other layers e.g. so as to be used by a lower-layer protocol, and it can read information placed in these frames by another apparatus.

The protocol identifier structure and field contents described above by way of example do not limit the invention to the two-byte identifier described above which comprises the abovementioned fields. The hierarchical protocol identifier according to the invention may also have a different structure, and the protocols that can be identified by means of the identifier may be others than those named above.

The protocol identifier according to the invention need not be hierarchical. The protocol identifier may comprise one or more fields each of which identifies a protocol or protocol element, but the protocol identifier does not contain a structure that could be used to deduce the relationship between the objects identified by the fields. Consecutive fields in the protocol identifier may e.g. identify the codec used for the coding of a video image and a packet radio network along the data connection. Such a protocol identifier is also in accordance with the invention.

A protocol may also denote the contents of information transferred. The protocol identifier may indicate e.g. whether the information transferred is speech, video image or data in general. In the cases of speech and video it is also possible to identify e.g. the codec used for speech or video image coding, the version number of the codec or the standard with which the bit stream produced by the codec complies.

Although it was above described the use of the method according to the invention mainly at the interface between a fixed network and radio access network, the ap-

plication of the invention is not limited to that particular interface.

Above it was described how the method according to the invention may be used primarily in the management of a data connection, selection of an information presentation format, and in the prioritization of information to be transferred. These
 5 examples however do not limit the use of the invention solely to these purposes.

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CLAIMS

1. A method for transferring information over a data connection according to a protocol stack where certain first protocol layers and certain second protocol layers exist, comprising the steps of
 - 5 - creating a protocol identifier,
 - determining a value for said protocol identifier in accordance with the first protocol layers in said protocol stack and
 - delivering said protocol identifier to the second protocol layers in said protocol stack.
- 10 2. The method of claim 1, comprising the steps of
 - establishing a data connection between a first communications apparatus and second communications apparatus,
 - determining a value for said protocol identifier in said first communications
 - 15 apparatus and
 - delivering said protocol identifier from the first communications apparatus to the second communications apparatus.
- 20 3. The method of claim 1, comprising the steps of
 - establishing a data connection between a first communications apparatus and a second communications apparatus via a third communications apparatus,
 - determining a value for said protocol identifier in said first communications
 - 25 apparatus and
 - delivering said protocol identifier from the first communications apparatus to the third communications apparatus.
4. The method of claim 1, comprising the steps of
 - establishing a data connection between a first communications apparatus and a second communications apparatus via a third communications apparatus,

- determining a value for said protocol identifier in said third communications apparatus and
- delivering said protocol identifier from the third communications apparatus to the first communications apparatus.

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5. The method of claim 1, comprising the steps of

- establishing a data connection between a first communications apparatus and a second communications apparatus via a third communications apparatus and a fourth communications apparatus,

- 10 - determining a value for said protocol identifier in said third communications apparatus and
- delivering said protocol identifier from the third communications apparatus to the fourth communications apparatus.

- 15 6. The method of claim 1, comprising the step of delivering said protocol identifier over said data connection.

7. The method of claim 1, comprising the step of delivering said protocol identifier over a control connection which is different than said data connection.

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8. The method of claim 1, comprising the step of delivering said protocol identifier in conjunction with the opening of said data connection.

9. The method of claim 1, comprising the step of delivering said protocol
25 identifier at a certain stage after the opening of said data connection.

10. The method of claim 1, comprising the step of repeatedly delivering said protocol identifier at certain intervals.

11. The method of claim 1, comprising the steps of
 - determining and delivering said protocol identifier more than once during said data connection,
 - determining said protocol identifier at each time on the basis of a certain part of the first protocol layers, and
 - choosing said part of the first protocol layers such that the chosen part is not identical at all instances of determination.
12. The method of claim 1, comprising the steps of
 - adapting said protocol identifier so as to comprise elements and
 - determining each element of said protocol identifier on the basis of a certain part of the first protocol layers.
13. The method of claim 12, comprising the steps of
 - adapting said protocol identifier so as to comprise a first element and a second element, and
 - determining said second element so that it defines in more detail a certain part of the first protocol layers generally defined by said first element.
14. The method of claim 1, comprising the step of placing said protocol identifier into a protocol frame of a certain protocol layer together with certain data to be transferred.
15. The method of claim 14, comprising the step of placing said protocol identifier into a field within a protocol frame which field is reserved for the protocol identifier.
16. The method of claim 15, comprising the step of placing said protocol identifier into a field within a protocol frame of a certain logical link control protocol.

17. The method of claim 1, comprising the step of determining a value for said protocol identifier in accordance with the contents of the data transferred over said data connection.

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18. A communications apparatus arranged to transfer information to another communications apparatus in accordance with a protocol stack comprising certain first protocol layers and certain second protocol layers, comprising

- means for creating a protocol identifier,
- 10 - means for determining the value of said protocol identifier in accordance with the first protocol layers of said protocol stack, and
- means for delivering said protocol identifier to the second protocol layers of said protocol stack in either said communications apparatus itself or in said other communications apparatus.

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19. A communications apparatus arranged to transfer information from another communications apparatus in accordance with a protocol stack comprising first and second protocol layers, comprising

- means for receiving at said second protocol layers a protocol identifier the value of
- 20 which is determined in accordance with the first protocol layers of said protocol stack.

20. A data communication system comprising

- a first communications apparatus and second communications apparatus
- 25 - means for transferring information between said first and second communications apparatuses in accordance with a protocol stack comprising certain first protocol layers and certain second protocol layers,
- at least in the first communications apparatus means for creating a protocol identifier,

- at least in the first communications apparatus means for determining the value of said protocol identifier in accordance with the first protocol layers of said protocol stack, and
- at least in the first communications apparatus means for delivering said protocol
5 identifier to the second protocol layers of said protocol stack.

21. The data communication system of claim 20, wherein

- the first communications apparatus is a wireless terminal in a radio access network,
- 10 - said means for transferring information is arranged to deliver said protocol identifier to the second communications apparatus, and
- the second communications apparatus is a network element in said radio access network.

15 22. The data communication system of claim 21, wherein said means for transferring information is arranged to deliver said protocol identifier across a radio interface of a mobile network in a call control connection.

23. The data communication system of claim 20, wherein

- 20 - the first communications apparatus is a network element in a radio access network,
- said means for transferring information is arranged to deliver said protocol identifier to the second communications apparatus, and
- the second communications apparatus is a wireless terminal in said radio access network.

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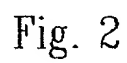
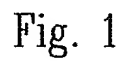
24. The data communication system of claim 23, wherein said means for transferring information is arranged to deliver said protocol identifier across a radio interface of a mobile network in a call control connection.

Abstract

A method for transferring information over a data connection in accordance with a protocol stack (206, 210) comprising first and second protocol layers. The method is characterized in that a protocol identifier is created the value of which is determined by means of the first protocol layers of said protocol stack and which is delivered to the second protocol layers of said protocol stack.

Fig. 2

Fig. 2



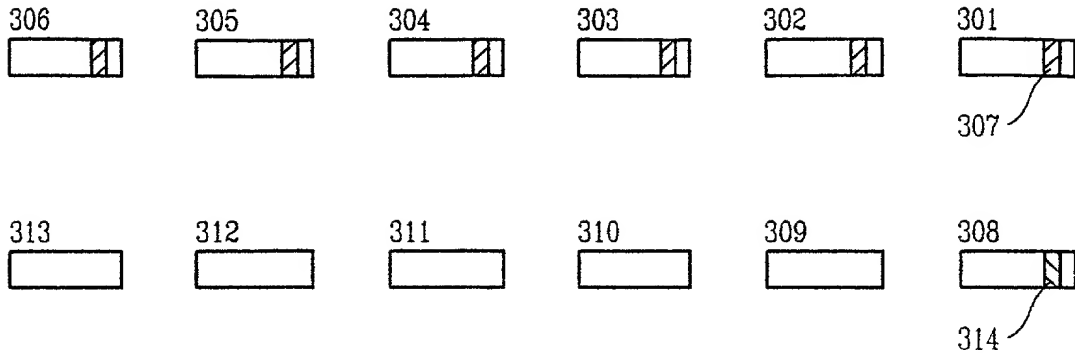


Fig. 3

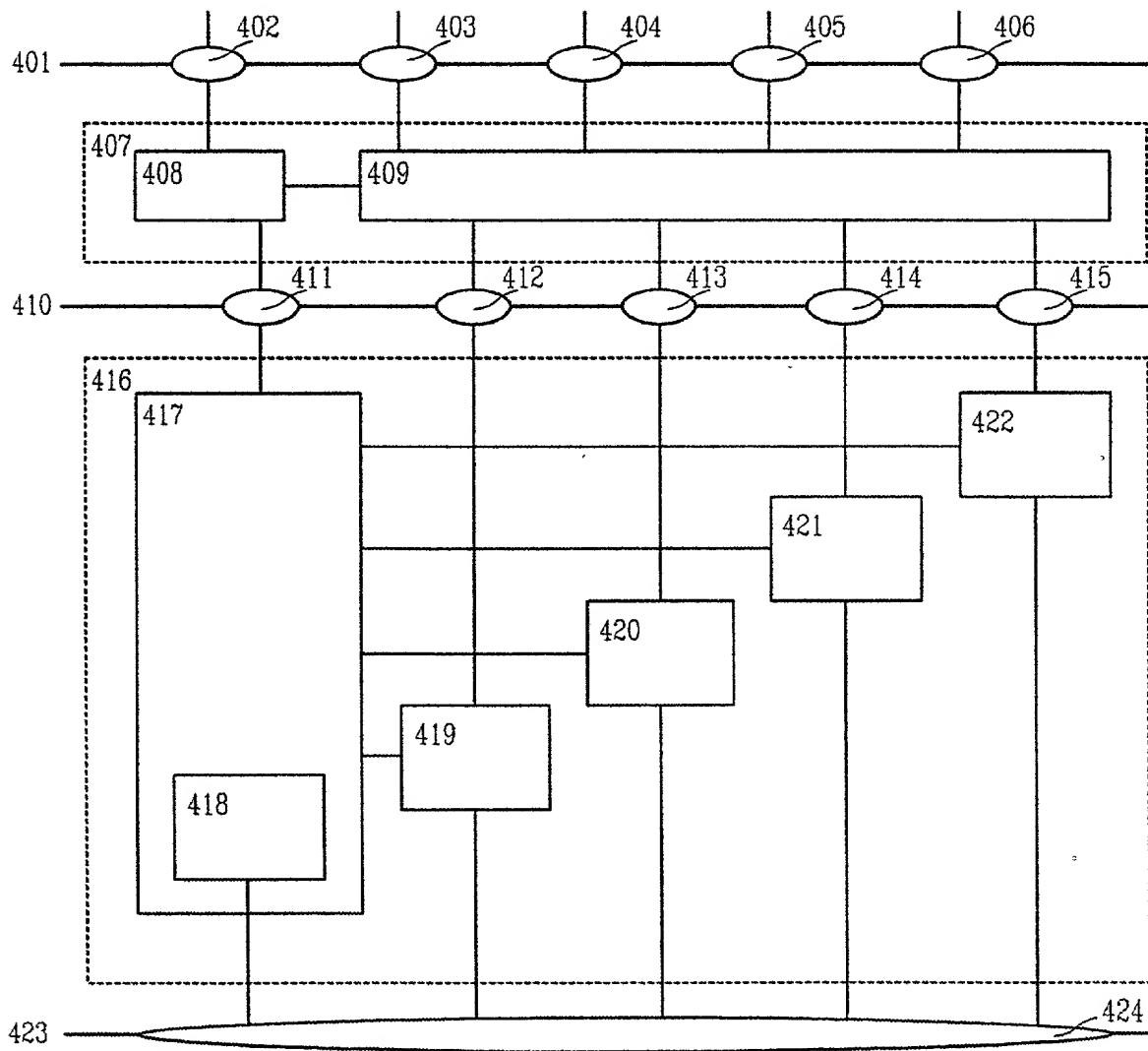


Fig. 4

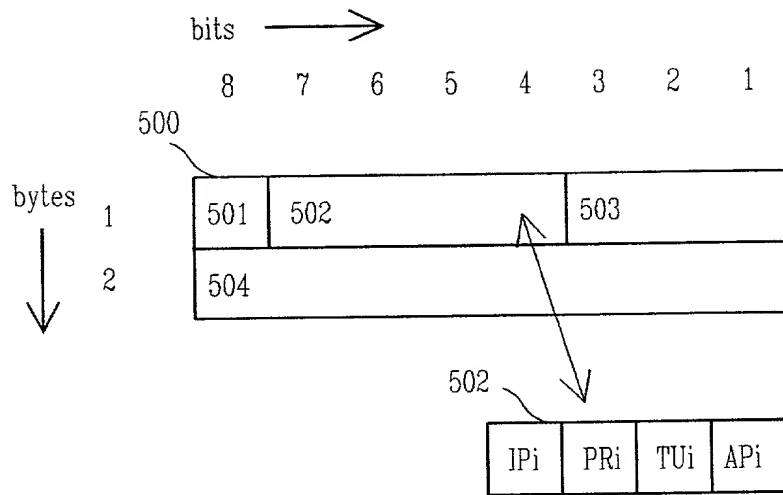


Fig. 5

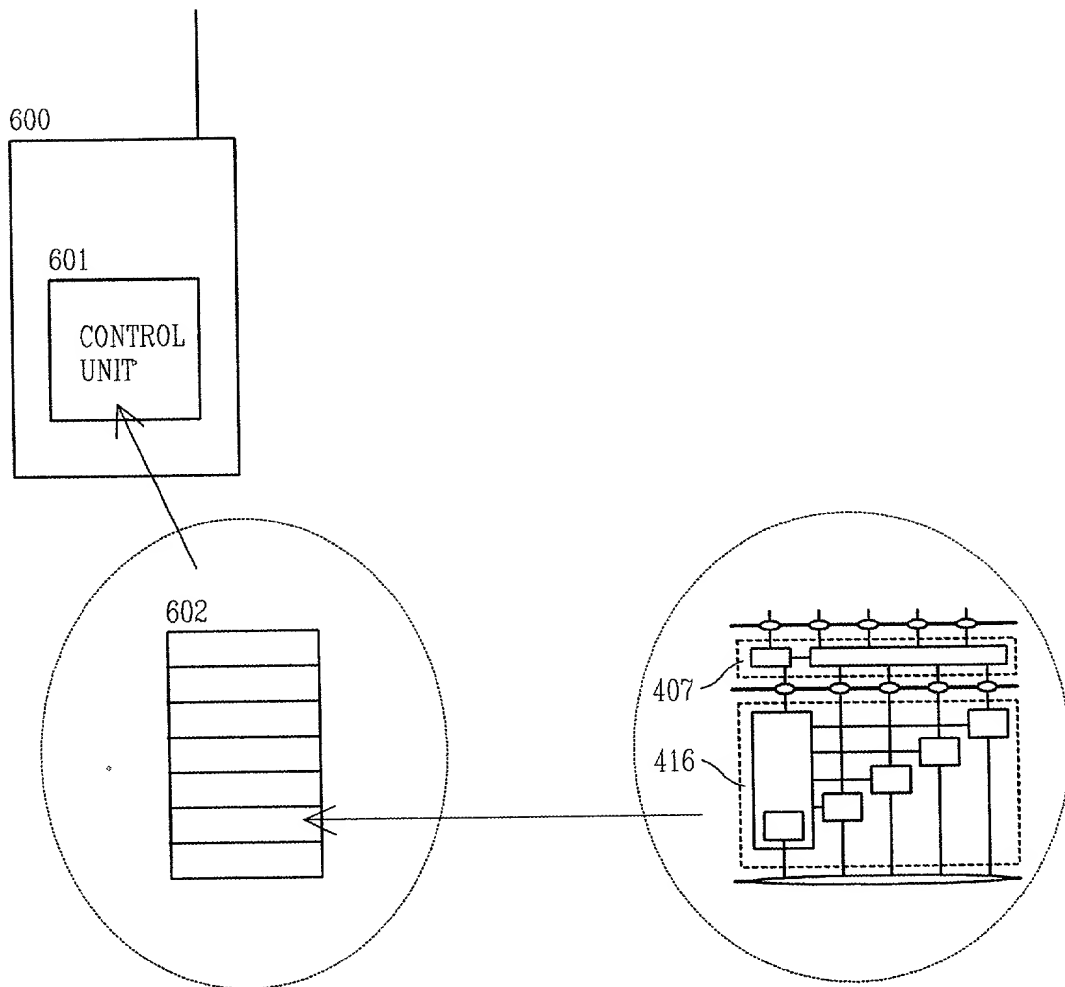


Fig. 6

**COMBINED DECLARATION AND POWER OF ATTORNEY
(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION OR C-I-P)**

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

- ☒ original.
☐ design.
☐ supplemental.

NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.
☐ national stage of PCT.

NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.

- ☐ divisional.
☐ continuation.
☐ continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

Method for informing layers of a protocol stack about the protocol in use

SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b) or (c))

(a) X is attached hereto.

(b) was filed on , as Serial No
or Express Mail No., as Serial No. not yet known
and was amended on *(if applicable)*.

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

(c) was described and claimed in PCT International Application No. ,
filed on and as amended under PCT Article 19 on
 (if any).

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

X and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and

 in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119(a)-(d))

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

(d) no such applications have been filed.

(e) X such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

COUNTRY(OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119	
FINLAND	990264	10 February 1999	<u>X</u> YES	NO __
			__ YES	NO __
			__ YES	NO __
			__ YES	NO __
			__ YES	NO __

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(34 U.S.C. § 119(e))**

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

FILING DATE

**CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)
UNDER 35 U.S.C. 120**

____ The claim for the benefit of any such applications are set forth in the attached
ADDED PAGES TO COMBINED DECLARATION AND POWER OF
ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-
PART (C-I-P) APPLICATION.

**ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

Clarence A. Green	(24,622)
Harry F. Smith	(32,493)
Mark F. Harrington	(31,686)

(check the following item, if applicable)

☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

Clarence A. Green
Perman & Green
425 Post Road
Fairfield, Ct 06430

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Clarence A. Green
203-259-1800

DECLARATION


I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

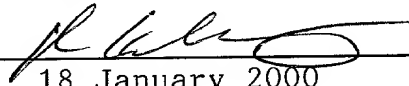
Full name of sole or first inventor:

Given name: Mika
Middle initial or name:
Family (or last name): RINNE

Inventor's signature: 
Date: 18 January 2000
Country of Citizenship: Finland
Residence: Kourakuja 3 B 10, FIN-02320 ESPOO, Finland
Post Office Address: Kourakuja 3 B 10, FIN-02320 ESPOO, Finland

Full name of second joint inventor, if any:

Given name: Juha
Middle initial or name:
Family (or last name): KALLIOKULJU

Inventor's signature: 
Date: 18 January 2000
Country of Citizenship: Finland
Residence: Jokioistentie 5, FIN-37470 VESILAHTI, Finland
Post Office Address: Jokioistentie 5, FIN-37470 VESILAHTI, Finland

Full name of third joint inventor, if any:

Given name:
Middle initial or name:
Family (or last name):

Inventor's signature: _____
Date: _____
Country of Citizenship: _____
Residence: _____
Post Office Address: _____

Full name of fourth joint inventor, if any:

Given name:
Middle initial or name:
Family (or last name):

Inventor's signature: _____
Date: _____
Country of Citizenship: _____
Residence: _____
Post Office Address: _____

(check proper box(es) for any of the following added page(s)
that form a part of this declaration)

___ **Signature** for fifth and subsequent joint inventors. *Number of pages added* ____.

* * *

___ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* ____.

* * *

___ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* ____.

* * *

___ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

* * *

___ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

___ Number of pages added ____

* * *

___ Authorization of attorney(s) to accept and follow instructions from representative.

* * *

(if no further pages form a part of this Declaration,
then end this Declaration with this page and check the following item)

X This declaration ends with this page.